

Application No.: 10/542,850

DOCKET NO: 274669US0PCT

**IN THE UNITED STATES PATENT & TRADEMARK OFFICE**

IN RE APPLICATION OF :  
HANS-DETLEF LUGINSLAND, ET AL. : EXAMINER: PARVINI, PEGAH  
SERIAL NO: 10/542,850 :  
FILED: JUNE 13, 2006 : GROUP ART UNIT: 1793  
FOR: SPECIALLY PRECIPITATED :  
SILICIC ACIDS FOR RUBBER  
APPLICATIONS

**APPEAL BRIEF**

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313-1450

SIR:

This is an appeal from the Examiner's Rejection dated July 16, 2008, of Claims 1-8, 18, 19 and 23-31. A Notice of Appeal was filed on November 17, 2008.

**I. REAL PARTY IN INTEREST**

The real party in interest is Evonik Degussa GmbH of Essen, Germany, by virtue of the name change recorded December 9, 2008, at Reel/Frame 021942/0114.

**II. RELATED APPEALS AND INTERFERENCES**

Appellants, Appellants' legal representative and their assignee are not aware of any other appeals or interferences which will directly affect or be directly affected by or having a bearing on the Board's decision in this appeal.

### **III. STATUS OF CLAIMS**

The appealed claims are Claims 1-8, 18, 19 and 23-31. Claims 1-8, 18, 19 and 23-31 stand rejected. Claim 24 stands objected to. Claims 9-17 and 20 stand withdrawn from consideration.

The status of Claims 1-8, 18, 19 and 23-31 is “previously presented”. The status of Claim 23 is “original”. The status of Claims 21 and 22 is “canceled”.

### **IV. STATUS OF AMENDMENTS**

No Amendment was filed after the Office Action of July 16, 2008.

### **V. SUMMARY OF CLAIMED SUBJECT MATTER**

As claimed in **Claim 1**, the present application relates to a precipitated silica which has the following physical and chemical properties:

CTAB surface area	100-200 m <sup>2</sup> /g,
BET/CTAB ratio	0.8-1.05,
DBP value	210-280 g/(100 g),
Sears value V <sub>2</sub>	10-30 ml/(5 g),
Moisture level	4-8%, and
Ratio of Sears value V <sub>2</sub> to	
BET surface area	0.150 to 0.370 ml/(5m <sup>2</sup> ).

See for example, page 4, lines 19-35 and page 5, lines 11-19, of the specification.

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

(A) Claims 1-7, 18, 19 and 23-31 stand rejected as being obvious under 35 U.S.C. §103 (a) over Esch et al (US 5,846,506) in view of Boyer et al (US 5,935,543).

(B) Claims 1-7, 18, 19 and 23-29 stand rejected as being obvious under 35 U.S.C. §103 (a) over Esch et al (US 5,846,506) in view of Luginsland (US 2002/0022693).

(C) Claims 1-5, 7, 8, 18, 19 and 23-31 stand rejected as being obvious under 35 U.S.C. §103 (a) over Uhrlandt et al (US 6,180,076) in view of Boyer et al.

(D) Claims 1-8, 18, 19 and 21-23 stand provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-9, 16-17 and 19-21 of co-pending application Serial No. 10/542,763.

(E) Claim 24 stands objected to as being dependent on a withdrawn claim.

## **VII. ARGUMENT**

### **Ground (A)**

Claims 1-7, 18, 19 and 23-31 stand rejected as being obvious under 35 U.S.C. §103 (a) over Esch et al (US 5,846,506) in view of Boyer et al (US 5,935,543). That rejection is untenable and should not be sustained.

Esch et al (US 5,846,506) in view of Boyer et al (US 5,935,543) fail to disclose or suggest a precipitated silica as claimed in **Claim 1** which has the following physical and chemical properties:

CTAB surface area	100-200 m <sup>2</sup> /g,
BET/CTAB ratio	0.8-1.05,
DBP value	210-280 g/(100 g),
Sears value V2	10-30 ml/(5 g),
Moisture level	4-8% , and

Ratio of Sears value  $V_2$  to

BET surface area                      0.150 to 0.370 ml/(5m<sup>2</sup>).

The specification states at page 5, line 27 to page 6, line 7, that:

The precipitated silicas of the invention have not only a **high absolute number of silanol groups (Sears value  $V_2$ )**, but also, when comparison is made with prior-art precipitated silicas, **a markedly increased ratio of the Sears value  $V_2$  to the BET surface area**. This means that the precipitated silicas of the invention in particular have a very high number of silanol groups based on the total surface area.

The precipitated silicas of the invention have not only an increased number of silanol groups but also low microporosity, i e. a **very low ratio of BET to CTAB**.

**The combination of the features** mentioned, in particular the high ratio of Sears value  $V_2$  to BET, gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers. These precipitated silicas of the invention have increased rubber activity, and exhibit very good dispersion behavior and a low vulcanization time.

Emphasis added.

Esch et al (US 5,846,506) in view of Boyer et al (US 5,935,543) do not disclose the **combination of the features** mentioned, in particular the high ratio of Sears value  $V_2$  to BET, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers. The combined references do not disclose that a high **ratio of the Sears value  $V_2$  to the BET surface area** as claimed (0.150 to 0.370) would give the advantages shown in the specification of the present invention.

Selection inventions, also referred to as "improvement patents," are a normal consequence of technological progress and are expressly provided for by statute. 35 U.S.C. § 101 ("Whoever invents . . . any new and useful . . . composition of matter, or any . . . *improvement thereof* . . . may obtain a patent therefor . . .") (emphasis added). *Eli Lilly & Co.*

*v. Zenith Goldline Pharms., Inc.*, 364 F. Supp. 2d 820, 897 (S.D. Ind. 2005); Affirmed by: *Eli Lilly & Co. v. Zenith Goldline Pharms., Inc.*, 471 F.3d 1369, 2006 U.S. App. LEXIS 31748, 81 U.S.P.Q.2d (BNA) 1324 (Fed. Cir. 2006).

Inventions based on the identification or selection of a specific material or compound with particularly desirable properties within a previously disclosed genus of such materials or compounds do not violate any of the substantive requirements for patentability. *See e.g., In re Ruschig*, 343 F.2d 965, 974-75, 52 C.C.P.A. 1238, 1965 Dec. Comm'r Pat. 482 (C.C.P.A. 1965) (prior generic disclosure did not anticipate later selected species under 35 U.S.C. § 102); *CFMT, Inc. v. Yieldup Int'l Corp.*, 349 F.3d 1333, 1340 (Fed. Cir. 2003) ("Improvement and selection inventions are ubiquitous in patent law . . ."); *In re Kaplan*, 789 F.2d 1574, 1578, 1580 (Fed. Cir. 1986) (prior generic patent claim did not invalidate claim to later selected species for double patenting); *In re Baird*, 16 F.3d 380, 382 (Fed. Cir. 1994) (prior generic disclosure did not render later selected species obvious under 35 U.S.C. § 103).

The claimed precipitated silicas have a ratio of Sears value  $V_2$  to BET surface area is 0.150 to 0.370 ml/(5m<sup>2</sup>). This correlates to a very high number of silanol groups based on the total surface area. (See the specification at page 5, line 27 to page 6, line 7).

Esch disclose an absolute range for the BET surface of 35 to 350 m<sup>2</sup>/g and an absolute number of silanol groups, i.e. silanol group range of 6 to 20. See col. 1, table.

As can be calculated from the examples of Esch, the ratio of Sears number / BET, i.e. the relative silanol group density, is in a range between **0.076 and 0.1125** and thus lower than the claimed **0.150 to 0.370**. The highest relative silanol group density disclosed in Esch is 0.1125 which is **about 25% lower than the lowest limit in the present claims**.

The Examiner argues that by dividing the broad silanol group number and the broad

BET number disclosed at col. 1, one would arrive at the claimed ratio. Each of the examples 1, 2 and 3 of Esch (US 5,846,506) discloses the BET and Sears value. The N<sub>2</sub> surface area is the BET. The Examples 4-12 use the silicas of Examples 2 or 3. Example 5 of Esch shows a comparison of BET to Sears number of the Examples of Esch and all state of the art silica, accordingly the state of the art silica have a Sears/BET ratio far below 0.170, too.

Even if the broad ranges of col. 1 of Esch are used to calculate the Sears/BET ratio, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. *Id.* See also *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08.

Moreover, Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). see also *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1322, 73 USPQ2d 1225, 1228 (Fed. Cir. 2004). See MPEP 2144.05 III.

Applicants have prepared a comparative Example comparing the silicas of the present invention with those of Example 3 of Esch (Example 3 of Esch is a commercial product "Ultrasil 3370", i. e. **the most important Example of Esch and the closest prior art**). A

comparison to the closest prior art is the appropriate comparison. Example 3 of Esch was the only product from the Esch patent which became a commercial product “Ultrasil 3370” (see Uhrlandt, US 6,180,076, col. 9, line 53 to 55).

A **Rule 132 Declaration** was filed June 9, 2008, entered by the Examiner as stated at page 2, first paragraph of the Office Action of July 16, 2008 (Exhibit A).

The Declaration states the following at page 1, last two paragraph to page 2, 1<sup>st</sup> and second paragraphs:

“Enclosed is a comparison experiment in which the properties of the silica according to Example 3 of US 5,846,506 are compared with those of the silica III of the Examples of the present invention (see page 35, starting at line 30 of the specification).

The precipitated silicas of the present invention have clearly improved processing properties because of the higher ratio of Sears number to BET. In other words, using the silicas of the present invention leads to drastically shorter vulcanization times, greater vulcanization rates and lower Mooney viscosities.

The enclosed comparison example therefore confirms the statements starting at page 16, line 28 of the specification, according to which the increased number of silanol groups per m<sup>2</sup> of surface area leads to improved and better binding of the coupling agent (silane).

The comparison example clearly demonstrates the relevance of the ratio of Sears number to BET and also shows that this parameter leads to a considerable improvement in performance of the silica of the present invention compared with the silica of US 5,846,506.”

The comparison example therefore confirms the statements starting at page 16, line 28 of the specification, according to which the increased number of silanol groups per m<sup>2</sup> of surface area leads to improved and better binding of the coupling agent (silane). The comparison example clearly demonstrates the relevance of the ratio of Sears number to BET of 0.150 to 0.370 ml/(5m<sup>2</sup>) and also shows that this parameter leads to a considerable improvement in performance of the silica of the present invention compared with the silica of US 5,846,506.

The Rule 132 Declaration further states at page 6, below the table to page 7, 3<sup>rd</sup> paragraph:

The compounds containing the silicas according to the present invention have a profile of rubber values superior to that of the US 5,846,506. For example, the properties of the raw mixture include a lower Mooney viscosity, as confirmed by the  $M_L$  value in the MDR test. Thus, improved processing behavior is demonstrated. In addition, the vulcanization time  $t_{90\%}$  and the vulcanization rate  $t_{80\%} - t_{20\%}$  are drastically reduced.

These greatly improved raw-mixture properties can be attributed in particular to the higher and therefore better ratio of Sears number to BET surface area, since hereby faster and more effective hydrophobing and thus greater binding capacity of the silane to the silica are possible.

The greatly improved properties of the vulcanized derivative can also be attributed for the most part to this analytical characteristic. For example, the improved binding of the silicas leads to better reinforcement of the vulcanized derivative in the tension test, as seen in the higher value of modulus 200% and the higher modulus 200% / 50% reinforcement factor. As a consequence, the DIN abrasion is improved by more than 18%. Surprisingly, the hysteresis behavior, which correlates directly with the rolling resistance of a tire finished with this running-surface compound, can also be improved simultaneously by more than 18% with the inventive silicas (see  $\tan \delta$ , 60 °C). This improvement is also confirmed by the ball rebound value, 70 °C.

The precipitated silicas of the present invention have clearly improved processing properties because of the higher ratio of Sears number to BET. In other words, using the silicas of the present invention leads to drastically shorter vulcanization times, greater vulcanization rates and lower Mooney viscosities.

The enclosed comparison example therefore confirms the statements starting at page 16, line 28 of the specification, according to which the increased number of silanol groups per  $m^2$  of surface area leads to improved and better binding of the coupling agent (silane).

The comparison example clearly demonstrates the relevance of the ratio of Sears number to BET and also shows that this parameter leads to a considerable improvement in performance of the silica of the present invention compared with the silica of US 5,846,506.

Boyer et al do not cure the defects of Esch et al as they do not disclose the combination of the claimed properties, in particular the high ratio of Sears value  $V_2$  to BET, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers.



The data presented in the Rule 132 Declaration rebut any prima facie case of obviousness. Applicants disagree with the Examiner's statement at page 17, last paragraph of the Office Action of July 16, 2008, that the data are not commensurate with scope of the claims. Moreover, the specification contains additional data for the claimed invention. See the table at page 36 of the specification. Further, regarding the test data shown in Table 4 at page 41 of the specification, it is disclosed at page 41, starting at line 4:

As can be seen from the data in Table 4, the Silica Ib and Silica II mixtures with the silicas of the invention have a lower vulcanization time  $t_{90\%}$  than the reference mixture REF, due to lower microporosity and therefore less surface-adsorption of accelerator. The advantageous higher activity of these silicas is reflected in the higher 100% and 300% stress values and the increased reinforcement factor. The dynamic properties of the mixtures with the silicas of the invention have likewise been improved. Ball rebound 0°C. is found to be lower, implying improved wet skid resistance, and ball rebound 60°C. is found to be higher, indicating better rolling resistance of a tire tread. The dynamic stiffnesses at 0 and 60°C. are at the same level as those of the reference mixture, while the hysteresis loss  $\tan\delta$  (60°C.) has an advantageously been lowered, indicating lower rolling resistance. In addition, the quality of dispersion of the silicas of the invention is extraordinarily high and, *inter alia*, better than that of the silica Ultrasil 7000 GR of the prior art, which itself has good dispersibility, thus achieving advantages in road abrasion.

Moreover, the Rule 132 Declaration clearly states that the precipitated silicas of the present invention have clearly improved processing properties because of the higher ratio of Sears number to BET. In other words, using the silicas of the present invention leads to drastically shorter vulcanization times, greater vulcanization rates and lower Mooney viscosities. The Declaration further states that the enclosed comparison example therefore confirms the statements starting at page 16, line 28 of the specification, according to which the increased number of silanol groups per  $\text{m}^2$  of surface area leads to improved and better binding of the coupling agent (silane). In addition, the Declaration also states that the comparison example clearly demonstrates the relevance of the ratio of Sears number to BET and also shows that this parameter leads to a considerable improvement in performance of the silica of the present invention compared with the silica of US 5,846,506.

Thus, the data presented are commensurate in scope with the claims.

The combined references do not disclose that a high **ratio of the Sears value  $V_2$  to the BET surface area** as claimed (0.150 to 0.370) would give the advantages shown in the specification of the present invention. The parameter ratio of Sears value  $V_2$  to BET surface area is not mentioned by even one word in Esch et al. Therefore, Esch did not know about the importance of said parameter. Instead Esch teaches other parameters as important.

The dependent claims

The dependent claims are separately patentable as Esch et al (US 5,846,506) in view of Boyer et al (US 5,935,543) fail to disclose or suggest a precipitated silica as claimed having the **combination of properties** claimed, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers.

Thus, Claims 1-7, 18, 19 and 23-31 are Not Obvious over Esch et al (US 5,846,506) in view of Boyer et al (US 5,935,543) within the meaning of 35 U.S.C. §103(a). For all the above reasons, it is respectfully requested that this rejection be REVERSED.

Ground (B)

Claims 1-7, 18, 19 and 23-29 stand rejected as being obvious under 35 U.S.C. §103 (a) over Esch et al (US 5,846,506) in view of Luginsland (US 2002/0022693). That rejection is untenable and should not be sustained.

Esch et al (US 5,846,506) in view of Luginsland (US 2002/0022693) fail to disclose or suggest a precipitated silica as claimed in **Claim 1**.

Esch et al (US 5,846,506) in view of Luginsland (US 2002/0022693) do not disclose the **combination of the features** mentioned, in particular the high ratio of Sears value  $V_2$  to BET, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers.

**Esch was discussed in detail in Ground (A) above.**

Luginsland does not cure the defects of Esch et al as there is no disclosure of the combination of the features mentioned, in particular the high ratio of Sears value  $V_2$  to BET, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers. The combined references do not disclose that a high **ratio of the Sears value  $V_2$  to the BET surface area** as claimed (0.150 to 0.370) would give the advantages shown in the specification of the present invention.

The dependent claims

The dependent claims are separately patentable as Esch et al (US 5,846,506) in view of Luginsland (US 2002/0022693) fail to disclose or suggest a precipitated silica as claimed having the **combination of properties** claimed, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers.

Thus, Claims 1-7, 18, 19 and 23-29 are Not Obvious over Esch et al (US 5,846,506) in view of Luginsland (US 2002/0022693) within the meaning of 35 U.S.C. §103(a). For all the above reasons, it is respectfully requested that this rejection be REVERSED.

Ground (C)

Claims 1-5, 7, 8, 18, 19 and 23-31 stand rejected as being obvious under 35 U.S.C. §103 (a) over Uhrlandt et al (US 6,180,076) in view of Boyer et al. That rejection is untenable and should not be sustained.

Uhrlandt et al (U.S. 6,180,076) in view of Boyer et al (US 5,935,543) fail to disclose or suggest a precipitated silica as claimed in **Claim 1**.

The specification states at page 5, line 27 to page 6, line 7, that:

The precipitated silicas of the invention have not only a **high absolute number of silanol groups (Sears value  $V_2$ )**, but also, when comparison is made with prior-art precipitated silicas, **a markedly increased ratio of the Sears value  $V_2$  to the BET surface area**. This means that the precipitated silicas of the invention in particular have a very high number of silanol groups based on the total surface area.

The precipitated silicas of the invention have not only an increased number of silanol groups but also low microporosity, i e. a **very low ratio of BET to CTAB**.

**The combination of the features** mentioned, in particular the high ratio of Sears value  $V_2$  to BET, gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers. These precipitated silicas of the invention have increased rubber activity, and exhibit very good dispersion behavior and a low vulcanization time.

Emphasis added.

Uhrlandt et al (U.S. 6,180,076) in view of Boyer et al (US 5,935,543) do not disclose the **combination of the features** mentioned, in particular the high ratio of Sears value  $V_2$  to BET, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers. The parameter ratio of Sears value  $V_2$  to BET surface area is not mentioned in Uhrlandt. Therefore, Uhrlandt did not know about the importance of said parameter. Instead Uhrlandt teaches other parameters as important.

Most notably, the Examples 1-5 of Uhrlandt et al disclose low ratios of Sears index to  $N_s$  surface area of 0.083; 0.053; 0.103; 0.092; and 0.099, respectively. So, even the highest ratio of Uhrlandt et al (0.103) is about 32 % lower than the lower limit of the ratio of the Sears value  $V_2$  to the BET surface area claimed (0.150).

Uhrlandt also uses Example 3 of Esch (discussed above) as representative comparison Example for the teaching of Esch and the Uhrlandt patent was granted even though the ranges of Uhrlandt overlap the ranges of Esch in a similar manner as in the present case.

Selection inventions, also referred to as "improvement patents," are a normal consequence of technological progress and are expressly provided for by statute. 35 U.S.C. § 101 ("Whoever invents . . . any new and useful . . . composition of matter, or any . . . *improvement thereof* . . . may obtain a patent therefor . . .") (emphasis added). *Eli Lilly & Co. v. Zenith Goldline Pharms., Inc.*, 364 F. Supp. 2d 820, 897 (S.D. Ind. 2005); Affirmed by: *Eli Lilly & Co. v. Zenith Goldline Pharms., Inc.*, 471 F.3d 1369, 2006 U.S. App. LEXIS 31748, 81 U.S.P.Q.2d (BNA) 1324 (Fed. Cir. 2006).

Inventions based on the identification or selection of a specific material or compound with particularly desirable properties within a previously disclosed genus of such materials or compounds do not violate any of the substantive requirements for patentability. *See e.g., In re Ruschig*, 343 F.2d 965, 974-75, 52 C.C.P.A. 1238, 1965 Dec. Comm'r Pat. 482 (C.C.P.A. 1965) (prior generic disclosure did not anticipate later selected species under 35 U.S.C. § 102); *CFMT, Inc. v. Yieldup Int'l Corp.*, 349 F.3d 1333, 1340 (Fed. Cir. 2003) ("Improvement and selection inventions are ubiquitous in patent law . . ."); *In re Kaplan*, 789 F.2d 1574, 1578, 1580 (Fed. Cir. 1986) (prior generic patent claim did not invalidate claim to later selected species for double patenting); *In re Baird*, 16 F.3d 380, 382 (Fed. Cir. 1994) (prior generic disclosure did not render later selected species obvious under 35 U.S.C. § 103).

The specification contains data for the claimed invention and showing the criticality of the claimed **high ratio of the Sears value  $V_2$  to the BET surface area compared to a silica having a low ratio of the Sears value  $V_2$  to the BET of 0.092** (Ultrasil 7000GR, **which is in the order of the silicas exemplified for Uhrlandt et al**). See the table at page 36 of the specification. Silica Ib (present invention) has a ratio of 0.167 and Silica II (present invention) has ratio of 0.190.

Further regarding the test data shown in Table 4 at page 41 of the specification, it is disclosed at page 41, starting at line 4:

As can be seen from the data in Table 4, the Silica Ib and Silica II mixtures with the silicas of the invention have a lower vulcanization time  $t_{90\%}$  than the reference mixture REF, due to lower microporosity and therefore less surface-adsorption of accelerator. The advantageous higher activity of these silicas is reflected in the higher 100% and 300% stress values and the increased reinforcement factor. The dynamic properties of the mixtures with the silicas of the invention have likewise been improved. Ball rebound 0°C. is found to be lower, implying improved wet skid resistance, and ball rebound 60°C. is found to be higher, indicating better rolling resistance of a tire tread. The dynamic stiffnesses at 0 and 60°C. are at the same level as those of the reference mixture, while the hysteresis loss  $\tan\delta(60^\circ\text{C.})$  has an advantageously been lowered, indicating lower rolling resistance. In addition, the quality of dispersion of the silicas of the invention is extraordinarily high and, inter alia, better than that of the silica Ultrasil 7000 GR of the prior art, which itself has good dispersibility, thus achieving advantages in road abrasion.

Thus, the data are commensurate in scope with the claims.

Boyer et al do not cure the defects of Uhrlandt et al as they do not disclose the combination of the claimed properties, in particular the high ratio of Sears value  $V_2$  to BET, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers. The combined references do not disclose or suggest that a high **ratio of the Sears value  $V_2$  to the BET surface area** as claimed (0.150 to 0.370) would give the advantages shown in the specification of the present invention.

Claim 6

Claim 6 is independently patentable because Uhrlandt et al (U.S. 6,180,076) in view of Boyer et al (US 5,935,543) fail to disclose or suggest a precipitated silica having a BET surface area is 80-110 m<sup>2</sup>/g. Uhrlandt et al only discloses a BET of 120 to 300 m<sup>2</sup>/g. See the abstract.

The other dependent claims

The dependent claims are separately patentable as Uhrlandt et al (U.S. 6,180,076) in view of Boyer et al (US 5,935,543) fail to disclose or suggest a precipitated silica as claimed having the **combination of properties** claimed, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers.

Thus, Claims 1-5, 7, 8, 18, 19 and 23-31 are Not Obvious over Uhrlandt et al (US 6,180,076) in view of Boyer et al within the meaning of 35 U.S.C. §103(a). For all the above reasons, it is respectfully requested that this rejection be REVERSED.



Ground (D)

Claims 1-8, 18, 19 and 21-23 stand provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-9, 16-17 and 19-21 of co-pending application Serial No. 10/542,763.

The claims of Serial No. 10/542,763 do not disclose the **combination of the features** claimed, which gives the precipitated silicas of the invention excellent suitability as reinforcing fillers for elastomers. Thus, this rejection should be withdrawn.

In addition, regarding the provisional double patenting rejection, the MPEP instructs the Examiner to withdraw the provisional rejection if it is the only issue remaining in one case and convert the provisional rejection in the other application to a double patenting rejection. MPEP 822.01.

For all the above reasons, it is respectfully requested that this rejection be REVERSED.

Ground (E)

Claim 24 stands objected to as being dependent on a withdrawn claim. That objection is untenable and should not be sustained. Claim 9 was erroneously withdrawn from consideration as clearly unity of invention exists in this application. See also the International Search Report dated July 21, 2005, receipt of which was acknowledged by the Office on Form PCT/DO/EO/903 (371 Acceptance Notice mailed August 8, 2006). Lack of unity of invention was not found by the International Authority. Applicants note that PCT Article 27(l) states that no national law shall require compliance with requirements relating to the form and contents of the International application different from or additional to those which are provided for in the Patent Cooperation Treaty and the Regulations. Claim 9 should not have been withdrawn from consideration. An appropriate and timely traversal was made

in the Response filed June 22, 2007. As a result the objection to Claim 24 should be withdrawn as well.

Moreover, once the product claims are found allowable, withdrawn process claims which depend from or otherwise include all the limitations of the allowable product claim should be rejoined. MPEP §821.04

For all the above reasons, it is respectfully requested that this objection be REVERSED.

Finally, Applicants note that MPEP §821.04 states, "if applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from or otherwise include all the limitations of the allowable product claim will be rejoined." Applicants respectfully submit that should the elected group be found allowable, the non-elected claims should be rejoined.


### **CONCLUSION**

For the above reasons, it is respectfully requested that all the rejections and objections still pending in the Office Action of July 16, 2008, be REVERSED.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

Claim 1: A precipitated silica which has the following physical and chemical properties:

CTAB surface area	100-200 m <sup>2</sup> /g,
BET/CTAB ratio	0.8-1.05,
DBP value	210-280 g/(100 g),
Sears value V <sub>2</sub>	10-30 ml/(5 g),
Moisture level	4-8%, and
Ratio of Sears value V <sub>2</sub> to	
BET surface area	0.150 to 0.370 ml/(5m <sup>2</sup> ).

Claim 2: The precipitated silica as claimed in claim 1, wherein the BET/CTAB ratio is from 0.9 to 1.03.

Claim 3: The precipitated silica as claimed in claim 1, wherein the Sears value V<sub>2</sub> is from 20 to 30 ml/ (5 g).

Claim 4: The precipitated silica as claimed in claim 1, wherein the CTAB surface area is from 100 to 160 m<sup>2</sup> /g.

Claim 5: The precipitated silica as claimed in claim 1, wherein the DBP value is from 250 to 280 g/(100 g).

Claim 6: The precipitated silica as claimed in claim 1, wherein the BET surface area is 80-110 m<sup>2</sup>/g.

Claim 7: The precipitated silica as claimed in claim 1, wherein the BET surface area is 110-150 m<sup>2</sup>/g.

Claim 8: The precipitated silica as claimed in claim 1, wherein the ratio of Sears value V<sub>2</sub> to the BET surface area is from 0.180 to 0.370 ml/(5 m<sup>2</sup>).

Claim 9: A process for preparing a precipitated silica, wherein  
in succession

- a) an aqueous solution of an alkali metal silicate or alkaline earth metal silicate and/or of an organic and/or inorganic base with pH from 7 to 14 is taken as initial charge,
- b) water glass and an acidifier are metered simultaneously into this initial charge at from 55 to 95°C, with stirring, for from 10 to 120 minutes,
- g) stirring of the resultant suspension is continued at from 80 to 98°C, for from 1 to 120 minutes,
- h) an acidifier is used to acidify to pH of from 2.5 to 5, and
- i) the material is filtered and dried.

Claim 10: The process as claimed in claim 9, wherein after step b) the additional  
steps of

- c) stopping the feed for from 30 to 90 minutes while maintaining the temperature,
- and

d) then, where appropriate, simultaneously feeding water glass and an acidifier at the same temperature, with stirring, for from 20 to 120 minutes, preferably from 20 to 80 minutes are carried out once or twice.

Claim 11: The process as claimed in claim 9, wherein, following b) or d), in step e) the pH is adjusted to from 3 to 11 by adding an acidifier.

Claim 12: The process as claimed in claim 11, wherein, following step b) or d), in step e) the pH is adjusted to from 7 to 10 by adding acid.

Claim 13: The process as claimed in claim 11, wherein, in an additional step f) the pH is increased to from 8 to 14 by adding a basic compound.

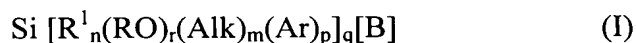
Claim 14: The process as claimed in claim 13, wherein the base used comprises an alkali metal silicate and/or alkaline earth metal silicate and/or an alkali metal hydroxide and/or an alkaline earth metal hydroxide.

Claim 15: The process as claimed in claim 9, wherein during one of steps a) to h) an organic or inorganic salt is added.

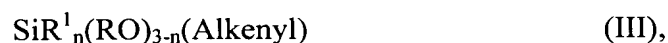
Claim 16: The process as claimed in claim 9, wherein for the drying process use is made of a pneumatic drier, spray drier, disk drier, belt drier, rotating-tube drier, flash drier, spin flash drier, or spray tower.

Claim 17: The process as claimed in claim 9, wherein  
after the drying process, a roller compactor is used for pelletizing.

Claim 18: The precipitated silica claimed in claim 1, wherein the surface of the  
precipitated silica has been modified with organosilanes of the formulae I to III



or



where

B is -SCN, -SH, -Cl, -NH<sub>2</sub>, -OC(O)CHCH<sub>2</sub>, -OC(O)C(CH<sub>3</sub>)CH<sub>2</sub> (if q = 1), or -S<sub>w</sub>- (if q = 2), B being chemically bonded to Alk,

R and R<sup>1</sup> are an aliphatic, olefinic, aromatic, or arylaromatic radical having 2-30 carbon atoms, optionally with substitution by the following groups: the hydroxyl, amino, alcoholate, cyanide, thiocyanide, halo, sulfonic acid, sulfonic ester, thiol, benzoic acid, benzoic ester, carboxylic acid, carboxylic ester, acrylate, methacrylate, or organosilane radical, where the meaning or substitution of R and R<sup>1</sup> may be identical or different,

n is 0, 1, or 2,

Alk is a bivalent unbranched or branched hydrocarbon radical having from 1 to 6 carbon atoms,

m is 0 or 1,

Ar is an aryl radical having from 6 to 12 carbon atoms, preferably 6 carbon atoms, which may have substitution by the following groups: the hydroxyl, amino, alcoholate, cyanide, thiocyanide, halo, sulfonic

	acid, sulfonic ester, thiol, benzoic acid, benzoic ester, carboxylic acid, carboxylic ester, acrylate, methacrylate or organosilane radical,
p	is 0 or 1, with the proviso that p and n are not simultaneously 0,
q	is 1 or 2,
x	is a number from 2 to 8,
r	is 1, 2, or 3, with the proviso that $r + n + m + p = 4$ ,
Alkyl	is a monovalent unbranched or branched saturated hydrocarbon radical having from 1 to 20 carbon atoms, preferably from 2 to 8 carbon atoms,
Alkenyl	is a monovalent unbranched or branched unsaturated hydrocarbon radical having from 2 to 20 carbon atoms, preferably from 2 to 8 carbon atoms.

Claim 19: The precipitated silica as claimed in claim 1, wherein the surface of the precipitated silica has been modified with organosilicon compounds whose composition is

$\text{SiR}^2_{4-n}\text{X}_n$  (where  $n = 1, 2, 3, 4$ ),

$[\text{SiR}^2_x\text{X}_y\text{O}]_z$  (where  $0 \leq x \leq 2$ ;  $0 \leq y \leq 2$ ;  $3 \leq z \leq 10$ , where  $x + y = 2$ ),

$[\text{SiR}^2_x\text{X}_y\text{N}]_z$  (where  $0 \leq x \leq 2$ ;  $0 \leq y \leq 2$ ;  $3 \leq z \leq 10$ , where  $x + y = 2$ ),

$\text{SiR}^2_n\text{X}_m\text{OSiR}^2_o\text{X}_p$  (where  $0 \leq n \leq 3$ ;  $0 \leq m \leq 3$ ;  $0 \leq o \leq 3$ ;  $0 \leq p \leq 3$ , where  $n+m=3$ ,  $o+p=3$ ),

$\text{SiR}^2_n\text{X}_m\text{NSiR}^2_o\text{X}_p$  (where  $0 \leq n \leq 3$ ;  $0 \leq m \leq 3$ ;  $0 \leq o \leq 3$ ;  $0 \leq p \leq 3$ , where  $n + m = 3$ ,  $o + p = 3$ ), and/or

$\text{SiR}^2_n\text{X}_m[\text{SiR}^2_x\text{X}_y\text{O}]_z\text{SiR}^2_o\text{X}_p$  (where  $0 \leq n \leq 3$ ;  $0 \leq m \leq 3$ ;  $0 \leq x \leq 2$ ;  $0 \leq y \leq 2$ ;  $0 \leq o \leq 3$ ;  $0 \leq p \leq 3$ ;  $1 \leq z \leq 10000$ , where  $n + m = 3$ ,  $x + y = 2$ ,  $o + p = 3$ )

where

$R^2$  is alkyl and/or aryl radicals, substituted and/or unsubstituted, having from 1 to 20 carbon atoms, and/or is alkoxy, and/or alkenyl, and/or alkynyl groups, and/or is sulfur-containing groups,

X is a silanol, amino, thiol, halogen, alkoxy, alkenyl and/or hydrogen radical.

Claim 20: A process for preparing the precipitated silica as claimed in claim 18, wherein the precipitated silicas are modified with organosilanes in mixtures of from 0.5 to 50 parts, based on 100 parts of precipitated silica, in particular from 1 to 15 parts, based on 100 parts of precipitated silica, where the reaction between precipitated silica and organosilane is carried out during the preparation of the mixture (in situ) or externally via spray application and subsequent heat-conditioning of the mixture, via mixing of the organosilane and the silica suspension with subsequent drying and heat-conditioning.

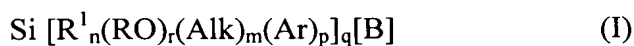
Claim 23: A vulcanizable rubber mixture or a vulcanizate comprising, as filler, the precipitated silica as claimed in claim 1, with the following physical and chemical properties:

CTAB surface area	100-200 m <sup>2</sup> /g
BET/CTAB ratio	0.8-1.05
DBP value	210-280 g/(100 g)
Sears value V <sub>2</sub>	10-30 ml/(5 g)
Ratio of Sears value V <sub>2</sub> to	
BET surface area	0.150 to 0.370 ml/(5m <sup>2</sup> )
Moisture level	4-8%.

Claim 24: A precipitated silica produced by the process as claimed in claim 9.



Claim 25: A precipitated silica as claimed in claim 23, wherein the surface of the precipitated silica has been modified with organosilanes of the formulae I to III



or



where

B is -SCN, -SH, -Cl, -NH<sub>2</sub>, -OC(O)CHCH<sub>2</sub>, -OC(O)C(CH<sub>3</sub>)CH<sub>2</sub> (if q = 1), or -S<sub>w</sub>- (if q = 2), B being chemically bonded to Alk,

R and R<sup>1</sup> are an aliphatic, olefinic, aromatic, or arylaromatic radical having 2-30 carbon atoms, optionally with substitution by the following groups: the hydroxyl, amino, alcoholate, cyanide, thiocyanide, halo, sulfonic acid, sulfonic ester, thiol, benzoic acid, benzoic ester, carboxylic acid, carboxylic ester, acrylate, methacrylate, or organosilane radical, where the meaning or substitution of R and R<sup>1</sup> may be identical or different,

n is 0, 1, or 2,

Alk is a bivalent unbranched or branched hydrocarbon radical having from 1 to 6 carbon atoms,

m is 0 or 1,

Ar is an aryl radical having from 6 to 12 carbon atoms, preferably 6 carbon atoms, which may have substitution by the following groups: the hydroxyl, amino, alcoholate, cyanide, thiocyanide, halo, sulfonic acid, sulfonic ester, thiol, benzoic acid, benzoic ester, carboxylic acid, carboxylic ester, acrylate, methacrylate or organosilane radical,

p is 0 or 1, with the proviso that p and n are not simultaneously 0,

q is 1 or 2,

x is a number from 2 to 8,

r is 1, 2, or 3, with the proviso that  $r + n + m + p = 4$ ,

Alkyl is a monovalent unbranched or branched saturated hydrocarbon radical having from 1 to 20 carbon atoms, preferably from 2 to 8 carbon atoms,

Alkenyl is a monovalent unbranched or branched unsaturated hydrocarbon radical having from 2 to 20 carbon atoms, preferably from 2 to 8 carbon atoms.

Claim 26: A precipitated silica as claimed in claim 23, wherein the surface of the precipitated silica has been modified with organosilicon compounds whose composition is

$\text{SiR}^2_{4-n}\text{X}_n$  (where  $n = 1, 2, 3, 4$ ),

$[\text{SiR}^2_x\text{X}_y\text{O}]_z$  (where  $0 \leq x \leq 2$ ;  $0 \leq y \leq 2$ ;  $3 \leq z \leq 10$ , where  $x + y = 2$ ),

$[\text{SiR}^2_x\text{X}_y\text{N}]_z$  (where  $0 \leq x \leq 2$ ;  $0 \leq y \leq 2$ ;  $3 \leq z \leq 10$ , where  $x + y = 2$ ),

$\text{SiR}^2_n\text{X}_m\text{OSiR}^2_o\text{X}_p$  (where  $0 \leq n \leq 3$ ;  $0 \leq m \leq 3$ ;  $0 \leq o \leq 3$ ;  $0 \leq p \leq 3$ , where  $n+m=3$ ,  $o+p=3$ ),

$\text{SiR}^2_n\text{X}_m\text{NSiR}^2_o\text{X}_p$  (where  $0 \leq n \leq 3$ ;  $0 \leq m \leq 3$ ;  $0 \leq o \leq 3$ ;  $0 \leq p \leq 3$ , where  $n + m = 3$ ,  $o + p = 3$ ), and/or

$\text{SiR}^2_n\text{X}_m[\text{SiR}^2_x\text{X}_y\text{O}]_z\text{SiR}^2_o\text{X}_p$  (where  $0 \leq n \leq 3$ ;  $0 \leq m \leq 3$ ;  $0 \leq x \leq 2$ ;  $0 \leq y \leq 2$ ;  $0 \leq o \leq 3$ ;  $0 \leq p \leq 3$ ;  $1 \leq z \leq 10000$ , where  $n + m = 3$ ,  $x + y = 2$ ,  $o + p = 3$ )

where

$\text{R}^2$  is alkyl and/or aryl radicals, substituted and/or unsubstituted, having from 1 to 20 carbon atoms, and/or is alkoxy, and/or alkenyl, and/or alkynyl groups, and/or is sulfur-containing groups,

X is a silanol, amino, thiol, halogen, alkoxy, alkenyl and/or hydrogen radical.

Claim 27: A process for preparing the precipitated silica as claimed in claim 19, wherein the precipitated silicas are modified with organosilanes in mixtures of from 0.5 to 50 parts, based on 100 parts of precipitated silica, in particular from 1 to 15 parts, based on 100 parts of precipitated silica, where the reaction between precipitated silica and organosilane is carried out during the preparation of the mixture (in situ) or externally via spray application and subsequent heat-conditioning of the mixture, via mixing of the organosilane and the silica suspension with subsequent drying and heat-conditioning.

Claim 28: An article, comprising:  
the precipitated silica as claimed in claim 1,  
wherein said article is an elastomer mixture, a vulcanizable rubber mixture, a pneumatic tire, a tire tread, cable sheathing, a hose, a drive belt, a conveyor belt, a V-belt, a roller covering, a tire, a shoe sole, a gasket or a damping element.

Claim 29: A method for producing the article as claimed in claim 27, comprising:  
adding the precipitated silica to the article during the manufacture of the article.

Claim 30: A composition comprising the precipitated silica as claimed in claim 1, wherein the composition is a battery separator, an antiblocking agent, a matting agent in inks and paints, a carrier for agricultural products and feeds, a coating, a printing ink, a fire extinguisher power, a plastic, a non-impact printing product, a paper pulp product or a personal care product.

Application No.: 10/542,850

Claim 31: A method for producing the composition as claimed in claim 30 comprising adding the precipitated silica to the composition during the manufacture of the composition.

IX. EVIDENCE APPENDIX

Exhibit A. Declaration under 37 C.F.R. 1.132 filed June 9, 2008, entered by the Examiner as stated at page 2, first paragraph of the Office Action of July 16, 2008.

# Exhibit A

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE APPLICATION OF:

GROUP: 1793

Hans-Detlef LUGINSLAND, et al.

SERIAL NO: 10/542,850

EXAMINER: PARVINI

FILED: June 13, 2006

FOR: SPECIALLY PRECIPITATED SILICIC ACIDS FOR RUBBER  
APPLICATIONS

**DECLARATION UNDER 37 C.F.R. § 1.132**

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313

Sir:

Now comes André Wehmeier who deposes and states that:

1. I am a graduate of FH Münster and received my diploma degree in the year 1998.
2. I have been employed by Evonik Degussa GmbH for 10 years as a chemical graduated engineer in the field of product development silica.
3. The following experiments were carried out by me or under my direct supervision and control.

Enclosed is a comparison experiment in which the properties of the silica according to Example 3 of US 5,846,506 are compared with those of the silica III of the Examples of the present invention (see page 35, starting at line 30 of the specification).

The precipitated silicas of the present invention have clearly improved processing properties because of the higher ratio of Sears number to BET. In other words, using the silicas of the present invention leads to drastically shorter vulcanization times, greater vulcanization rates and lower Mooney viscosities.

The enclosed comparison example therefore confirms the statements starting at page 16, line 28 of the specification, according to which the increased number of silanol groups per m<sup>2</sup> of surface area leads to a faster and more efficient hydrophobation (the bonding of the

coupling agent (silane) on the silica surface). As a consequence it is additionally the vulcanizate data are strongly improved regarding reinforcement, abrasion resistance and hysteresis loss values.

The comparison example clearly demonstrates the relevance of the ratio of Sears number to BET and also shows that this parameter leads to a considerable improvement in performance of the silica of the present invention compared with the silica of US 5,846,506.

#### General Standard Operating Procedure (SOP):

The silica of the present invention was tested in a typical passenger car tire tread compound. The formula used for the rubber mixtures is presented in the following Table 1, in which the unit "phr" means parts by weight relative to 100 parts of the raw rubber used.



Substance	phr	Article designation	Company
<b>1<sup>st</sup> step</b>	<b>Basic mixing</b>		
Buna VSL 5025-1	96.0	S-SBR; oil-extended	Lanxess Europe GmbH & Co. KG; 51369 Leverkusen; Germany
Buna CB 24	30.0	cis-1,4-BR	Lanxess Europe GmbH & Co. KG; 51369 Leverkusen; Germany
Silica	80.0		
X 50-S	12.8	SI 69 (bis(3-triethoxysilylpropyl)tetrasulfane) / carbon black of type N 330: 50% / 50%	Evonik Degussa GmbH; 45128 Essen; Germany
ZnO; RS RAL 844 C	3.0	ZnO	Amsperger Chemikalien GmbH; 50858 Cologne; Germany
EDENOR ST1 GS	2.0	Palmitic-stearic acid; "iodine number 1" stearin	Caldic Deutschland GmbH & Co. KG' 40231 Düsseldorf; Germany
Naftolen ZD	10.0	Aromatic plasticizer oil	Chemetall GmbH; 60487 Frankfurt a. Main; Germany
Vulkanox 4020 / LG	1.5	N-(1,3-Dimethylbutyl)-N'-phenyl-p-phenylenediamine (6PPD)	Rhein Chemie Rheinau GmbH; 68219 Mannheim Rheinau; Germany
Protektor G 3108	1.0	Mixture of refined hydrocarbon waxes	Paramelt BV; 706875 Paramelt BV; NL 1704 RJ Heerhugowaard; The Netherlands
<b>2<sup>nd</sup> step</b>	<b>Remill step</b>		
Step 1 batch			
<b>3<sup>rd</sup> step</b>	<b>Finish mixing</b>		
Step 2 batch			
Vulkacit D	2.0	N,N'-Diphenylguanidine (DPG)	Rhein Chemie Rheinau GmbH; 68219 Mannheim Rheinau; Germany
Vulkacit CZ/EG-C	1.5	N-Cyclohexyl-2-benzothiazole sulfenamide (CBS)	Rhein Chemie Rheinau GmbH; 68219 Mannheim Rheinau; Germany
Perkacit TBZTD	0.2	Tetrabenzylthiuram disulfide (TBZTD)	Flexsys N.V./S.A., Woluwe Garden; B-1932 St. Stevens Woluwe; Belgium
Ground sulfur	1.5	Finely divided sulfur according to Ph Eur, BP	Merck KGaA; 64271 Darmstadt; Germany

Table 1: Formula for a passenger car tire tread compound

The general method for manufacture of rubber mixtures and their vulcanized derivatives is described in the following book: "Rubber Technology Handbook", W. Hofmann, Hanser Verlag 1994. The specific mixing conditions for the various compounds are presented in Table 2.

<b>1<sup>st</sup> step</b>	Brabender 350 S mixer, filling level 0.73, 70 rpm, chamber temperature 70 °C, friction 1 : 1.11 ramp pressure 5 bar
0.0 to 0.5 minutes 0.5 to 1.5 minutes 1.5 minutes 1.5 to 2.5 minutes 2.5 minutes 2.5 to 3.5 minutes  3.5 minutes 3.5 to 5.0 minutes  5.0 minutes	Polymers 1/3 silica, X 50-S Clean 1/3 silica Clean 1/3 silica, ZnO, stearic acid, oil, Vulkanox 4020, Protéktor Clean Mix; with speed variation if necessary, in order to reach the dump temperature dump batch (batch temperature 145 °C to 155 °C) and process on an open mill: Cut in and fold over 3 * on left, 3 * on right, Roll up and pass through a tight nip 5 *, through a wide nip 5 * Sheet off
24 hours intermediate storage at room temperature to step 2	
<b>2<sup>nd</sup> step</b>	Brabender 350 S mixer, filling level 0.71, 80 rpm, chamber temperature 80 °C, friction 1 : 1.11 ramp pressure 5 bar
0.0 to 2.0 minutes 2.0 to 5.0 minutes  5.0 minutes	Plasticize batch from step 1 Maintain batch temperature at 150 °C by speed variation dump batch (batch temperature 145 °C to 155 °C) and process on an open mill: Cut in and fold over 3 * on left, 3 * on right, Roll up and pass through a tight nip 5 *, through a wide nip 5 * Sheet off
4 hours intermediate storage at room temperature to step 3	
<b>3<sup>rd</sup> step</b>	Brabender 350 S mixer, filling level 0.69, 50 rpm, chamber temperature 60 °C, friction 1 : 1.11 ramp pressure 5 bar
0.0 to 0.5 minutes 0.5 to 2.0 minutes 2.0 minutes	Batch from step 2 Constituents of the 3 <sup>rd</sup> step dump batch (batch temperature 90 °C to 110 °C) and process on an open mill: Cut in and fold over 3 * on left, 3 * on right, Roll up and pass through a tight nip 5 *, through a wide nip 5 * Sheet off in the thickness necessary for

	preparation of the test specimens
12 hours intermediate storage at room temperature until vulcanization of the test specimens	

Table 2: Mixing SOP

Technological rubber testing takes place according to the test methods presented in Table 3.

Physical testing	Standard / Conditions
ML (1+4), 100 °C, 3 <sup>rd</sup> step (MU)	DIN 53523/3 ISO 667
Vulcameter test, temperature, 165 °C, strain 0.5 ° MDR rheometer M <sub>L</sub> (dNm) t 90% (minutes) t 80% - t 20% (minutes)	DIN 53529/3 ISO 6502
Tensile test; dumb-bell S 1, 23 °C (median values from 3 dumb-bells) Modulus 200% (MPa) Modulus 200% / modulus 50% (—)	DIN 53504, ISO 37
Ball rebound 70 °C (%)	DIN EN ISO 8307, drop height 500 mm, steel ball, d = 19 mm, 28 g
DIN abrasion, 23 °C, 10 N force (mm <sup>3</sup> )	DIN 53516
Viscoelastic properties, 50 N preliminary force and 25 N amplitude force, 16 Hz Temperature equilibration time 5 minutes, recording of measured values after 30 s of test time tan δ, 60 °C (—)	DIN 53513, ISO 2856

Table 3: Test methods

Table 4 below presents the application-related data of the mixtures compounded and tested according to Tables 1 to 3.

		US 5,846,506 Example 3	Silica III
<i>ML (1+4), 100 °C, 3<sup>rd</sup> step</i>	MU	90	87
<i>MDR: 165 °C; 0.5 °</i>			
<i>M<sub>L</sub></i>	dNm	3.5	2.9
<i>t 90%</i>	min	9.7	5.2
<i>t 80% - t 20%</i>	min	3.2	1.8
<i>Vulcanization time (165 °C)</i>	min	20	20
<i>Modulus 200%</i>	MPa	8.0	13.2
<i>Modulus 200% / modulus 50%</i>	—	5.0	7.3
<i>DIN abrasion; 10 N</i>	mm <sup>3</sup>	77	62
<i>Ball rebound; 70 °C</i>	%	65.8	69.2
<i>Zwick: 16 Hz; 50 N ± 25 N</i>			
<i>tan δ, 60 °C</i>	—	0.134	0.109

Table 4: Results

The compounds containing the silicas according to the present invention have a profile of rubber values superior to that of the US 5,846,506. For example, the properties of the raw mixture include a lower Mooney viscosity, as confirmed by the *M<sub>L</sub>* value in the MDR test. Thus, improved processing behavior is demonstrated. In addition, the vulcanization time 90% and the vulcanization rate *t 80% - t 20%* are drastically reduced.

These greatly improved raw-mixture properties can be attributed in particular to the higher and therefore better ratio of Sears number to BET surface area, since hereby faster and more effective hydrophobing and thus greater binding capacity of the silane to the silica are possible.

The greatly improved properties of the vulcanized derivative can also be attributed for the most part to this analytical characteristic. For example, the improved binding of the silicas leads to better reinforcement of the vulcanized derivative in the tension test, as seen in the higher value of modulus 200% and the higher modulus 200% / 50% reinforcement factor. As a consequence, the DIN abrasion is improved by more than 18%. Surprisingly, the hysteresis

behavior, which correlates directly with the rolling resistance of a tire finished with this running-surface compound, can also be improved simultaneously by more than 18% with the inventive silicas (see  $\tan \delta$ , 60 °C). This improvement is also confirmed by the ball rebound value, 70 °C.

The precipitated silicas of the present invention have clearly improved processing properties because of the higher ratio of Sears number to BET. In other words, using the silicas of the present invention leads to drastically shorter vulcanization times, greater vulcanization rates and lower Mooney viscosities. As a consequence of this additionally the vulcanizate data are strongly improved regarding reinforcement, abrasion resistance and hysteresis loss values.

The enclosed comparison example therefore confirms the statements starting at page 16, line 28 of the specification, according to which the increased number of silanol groups per  $\text{m}^2$  of surface area leads to improved and better binding of the coupling agent (silane).

The comparison example clearly demonstrates the relevance of the ratio of Sears number to BET and also shows that this parameter leads to a considerable improvement in performance of the silica of the present invention compared with the silica of US 5,846,506.

4. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

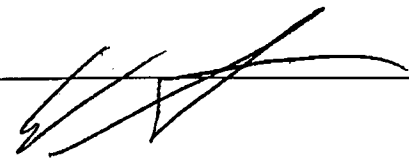
5. Further dep nt saith not.

Customer Number

**22850**

Tel. (703) 413-3000  
Fax. (703) 413-2220  
(OSMMN 05/06)

Signature

A handwritten signature in black ink, consisting of several overlapping diagonal strokes, is written over a horizontal line.

Date

05.06.2008

X. RELATED PROCEEDINGS APPENDIX

None.